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Aflatrem: a tremorgenic mycotoxin with acute neurotoxic effects

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Abstract

Tremorgenic mycotoxins induce neurologic symptoms ranging from mental confusion to tremors, seizures and death, and are apparently the only class of mycotoxins with significant central nervous system activity. Tremorgens have been implicated in a number of neurologic diseases of cattle collectively known as staggers syndromes, and pose significant agricultural and health problems for both cattle and humans. Although the effects of tremorgens are thought to result from transient perturbations of amino acid neurotransmitter release mechanisms, there is reason to believe that acute exposures to toxins with such synaptic effects may result in degeneration of neuronal fiber processes. To test this hypothesis, rats were given a single tremorgenic (3 mg/kg, IP) dose of aflatrem, and kinetics of amino acid neurotransmitter uptake was assessed in isolated hippocampal nerve terminals at 1 day, 1 week, and 2 weeks after injection. Results indicate a decrease in the capacity of the GABA and glutamate uptake systems, which was interpreted as a loss of nerve terminals. The affinity constants suggest a decrease in release of these transmitters as well. In addition to its transient influence on transmitter release, a single low dose of aflatrem is able to induce degeneration of neuronal processes in hippocampal neurotransmitter systems and therefore represents a long-term health threat.

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